

Deactivation of Psychoactive Drugs Using an Activated Carbon Based Drug Disposal System

INTRODUCTION

Proper disposal of expired, unwanted, or unused medications in households will help reduce harm from accidental exposure or intentional misuse. FDA recommends mixing unwanted medicines with an unpalatable substance such as dirt or used coffee grounds and then discarding it in household trash. Other than the risk of these medications to be found and used by others, they can end up contaminating food and water supplies. Therefore, a safe and secure drug disposal system seems to be beneficial for household use. In this study, a drug deactivation system named Deterra™ was used. The major component of this system is activated carbon which is considered to be a universal adsorbent. It is a convenient and easy system in that consumers can simply dispose their unwanted medications. The purpose of this study was to evaluate this system's efficiency in deactivating a number of medications.

METHODS

Deactivation Study

Dextroamphetamine, temazepam, and alprazolam were included in this study. Ten tablets/capsules of each drug were placed in a pouch containing 15 grams of granulated activated carbon. Then 50 mL of warm tap water was added. Pouches were then sealed, shaken, and stored undisturbed at room temperature. Drug deactivation was evaluated at different time points: 8h, 1,2, 4, 7, 14, 21, and 28 days (N=2). Samples were taken from the pouches, and then analyzed using HPLC-UV.

Desorption Study

After 28 days, contents of each pouch were transferred into a container and 200 mL water was added.

They were shaken for 1 hour and then stored at room temperature for 23 hours. After 24 hours, the water content was replaced with 30% ethanol, and the same procedure was repeated. Samples were taken from water and ethanol washouts, and then analyzed using HPLC-UV.

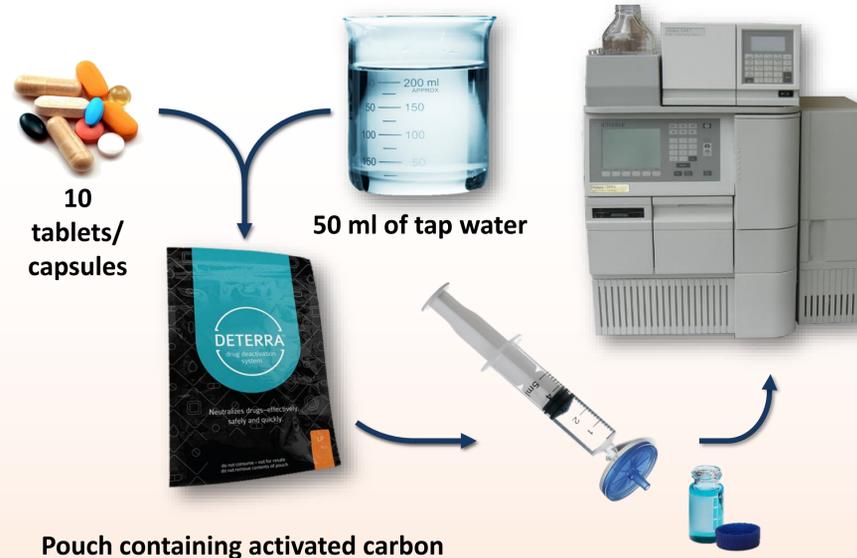


Figure 1. A schematic diagram of deactivation study

RESULTS

Results of the deactivation study showed that more than 98% of drugs were deactivated by 8 hours for all three medications. Dextroamphetamine and alprazolam were completely deactivated, and 99.32% of temazepam was deactivated by the 28 day.

	% Leached into Water	% Leached into Ethanol
Alprazolam	0.00%	0.00%
Temazepam	0.05%	0.04%
Dextroamphetamine	0.00%	9.39%

Table 1. Desorption study results

DRUG DEACTIVATION

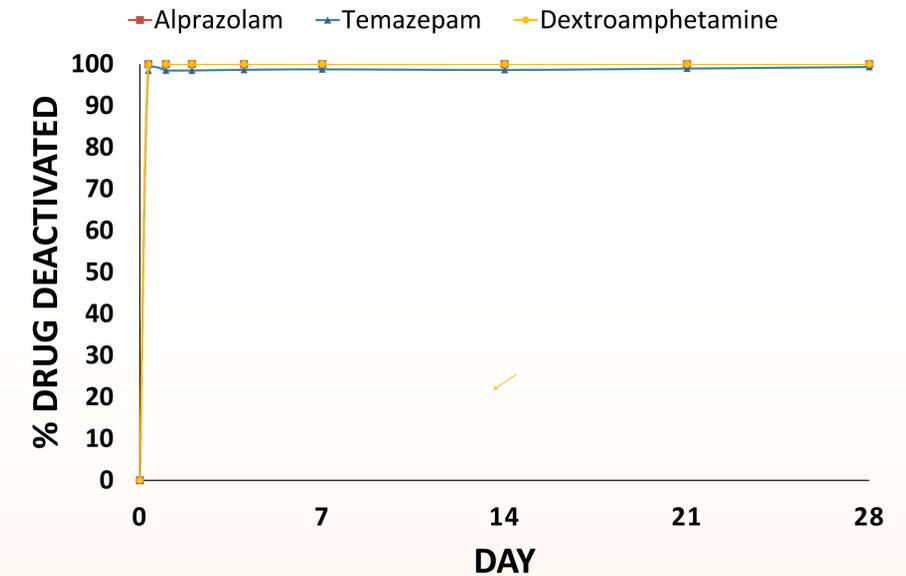


Figure 2. Deactivation profile of all medications during a 28 day period

CONCLUSION

Activated carbon was successfully able to deactivate the three investigated medications. The deactivation was rapid, and the amount of drug that was leached into water and ethanol for most medications, was insignificant. This suggests activated carbon based drug deactivation system provides a convenient, secure, and effective disposal method for unwanted medications.

REFERENCES

1. U.S. Food and Drug Administration. (2015, June 4). Retrieved July 14, 2016, from <http://www.fda.gov/ForConsumers/ConsumerUpdates/ucm101653.htm>

ACKNOWLEDGMENT

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